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IS 11149 (1984): Rubber Gaskets [MED 30: Gaskets and Packing]

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IS : 11149 - 1984

(Reaffirmed 1999)

Indian Standard

SPECIFICATION FOR RUBBER GASKETS

Gaskets and Packaging Sectional Committee, EDC 58; Gaskets for Automobiles Subcommittee, EDC 58 : 2 [Ref : Doc : EDC 58 (3792)]

1. Scope — Prescribes requirements and tests for vulcanized rubber gaskets of four different types for various applications. Each type is divided into a number of classes in different hardness ranges.

2. Types and Classes

2.1 *Types* — Vulcanized rubber gaskets shall be of four types depending upon the service conditions and applications, namely:

Type I — General purpose gaskets having superior physical properties.

Type II — General purpose gaskets having moderately good physical properties.

Type III — Oil resistant gaskets suitable for lubricating oil and fuels.

Type IV — Heat and oil resistant gaskets.

2.2 *Classes* — There shall be five classes in Type I and three classes each in other types, depending upon their hardness as given in Tables **1** to **4**.

3. Requirements

3.1 *Polymer* — The polymer or blends of polymers shall be as given under each type. However, other polymers as agreed to between purchaser and supplier may be used provided all other test requirements are satisfied. All the constituent of the mix shall be free from foreign matter and grit.

3.2 *Workmanship and Finish* — The gaskets shall be free from all such defects which may be deterimental to performance.

3.3 *Thickness* — The recommended thicknesses of the rubber gaskets are 1, 1·6, 2, 2·5, 3, 3·5, 4, 5 and 6 mm.

3.4 *Tolerances on Specified Dimensions* — Tolerances on specified dimensions shall be as agreed to between the purchaser and the supplier.

4. Specific Requirements for Type I

4.1 This type refers to gaskets having superior physical properties, and useful at temperatures up to 70°C, not resistant to oils or solvents. Either natural or synthetic rubber or a blend thereof shall be used in the manufacture of these gaskets Use of reclaimed rubber or ground vulcanized rubber is not permitted.

4.2 The gaskets are classified in five classes (A, B, C, D and E) and their physical properties shall be as given in Table 1.

4.3 *Accelerated Ageing* — The maximum variation of hardness after ageing at 70 ± 1°C for 72 hours in accordance with the method prescribed under **8.3** shall not be more than ±5 IRHD. The tensile strength shall not vary more than +10 percent and ultimate elongation shall not vary more than − 15 percent when tested in accordance with the method prescribed under **8.3**.

4.4 *Water Absorption* — The gaskets shall not absorb more than 10 percent water by weight, when tested as prescribed in Appendix A. If the gaskets are to be used for food products, the water shall be free from turbidity, odour or taste at the end of the test.

5. Specific Requirements for Type II

5.1 This type refers to gaskets having moderately good physical properties and not intended for use in stringent working conditions. Either natural or synthetic rubber or a blend thereof may be used in their manufacture. Reclaimed rubber and ground vulcanized rubber may also be used.

Adopted 15 November 1984

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TABLE 1 PHYSICAL PROPERTIES OF TYPE I GASKETS

(*Clause* 2.2 and 4.2)

Physical Properties	Class				
	A	B	C	D	E
Hardness, IRHD	41-50	51-60	61-70	71-80	81-90
Tensile strength, (kg/cm^2), *Min*	200	175	175	140	120
Ultimate elongation (%)	500	450	400	350	200
Compression set at 70°C, *Max*	20	25	30	35	40

5.2 The gaskets are divided in three classes (2A, 2B and 2C) and their physical properties shall be as given in Table 2.

TABLE 2 PHYSICAL PROPERTIES OF TPYE II GASKETS

Physical Properties	Class		
	2 A	2 B	2 C
Hardness, IRHD	51-60	61-70	71-80
Tensile strength kg/cm^2, (*Min*)	85	70	60
Ultimate elongation (%), (*Min*)	200	250	200
Compression set at 70°C	35	35	45

5.3 *Accelerated Ageing* — The maximum variation of hardness after ageing at 70 ± 1°C for 72 hours in accordance with method prescribed in **8.3** shall not be more than ±5 IRHD. The tensile strength shall not vary by more than +10 percent and ultimate elongation shall not vary more than —35 percent from that of unaged samples.

6. Specific Requirements for Type III Oil Resistant Gaskets

6.1 The gaskets of this type shall be suitable for hydro-carbon oils and fuels having aromatic content not exceeding 25 percent. For gaskets for use in oils having higher aromatic content, the manufacturer may be consulted. The gaskets shall be suitable for oil and heat resistant applications up to 100°C temperature. Basic polymer (nitrile and SBR rubber or neoprene) shall be used in their manufacture.

6.2 The phycial properties of these gaskets shall be as given in Table 3.

TABLE 3 PHYSICAL PROPERTIES OF TYPE III GASKETS

Physical Properties	Class		
	3A	3B	3C
Hardness, IRHD	Up to 50	51-70	Above 70
Tensile strength (kg/cm^2)	80	100	120
Ultimate elongation (%), *Min*	300	250	200
Compression set at 70°C, (%)	30	30	30

6.3 *Accelerated Ageing* — The maximum variation of hardness after ageing at 100 ± 2°C for 70 hours in accordance with method prescribed under **8.3** shall not be more than ±15 IRHD. The tensile strength shall not vary by more than +10 percent and elongation by — 35 percent from that of unaged sample.

6.4 *Ageing in Oil* — After ageing in applicable oil (*see* Note) at 100 ± 2°C for 72 hours, the hardness IRHD shall not vary by more than ±8 points, the tensile strength shall not vary by more than —35 percent and volume by $^{+20}_{-8}$ percent with respect to actual values recorded before ageing.

Note — Additives used in various oils can affect the performance of rubber and hence while selecting the polymer, compatibility with oil under application needs to be established.

6.5 *Ageing in Iso-octane* — After ageing in *iso*-octance [*see* ' Liquid A ' in IS : 3400 (Part 6) - 1983] at 70 ± 2°C for 70 hours, IRHD shall not vary more than $^{+0}_{-13}$ IRHD, the tensile strength shall not vary by more than + 0 to — 40 percent and volume shall not vary by more than +12 percent wtth respect to actual values recorded before ageing.

7. Specific Requirements for Type IV

7.1 This type refers to gaskets having good to excellent heat and oil resistance properties. Basic polymer such as, NBR (nitrile), ACM (polyacrylate), FKM (fluorocarbon rubber-viton) or silicone rubber shall be used in their manufacture.

7.2 The gaskets are divided into three classes and their physical properties shall be as given in Table 4.

TABLE 4 PHYSICAL PROPERTIES OF TYPE IV GASKETS

Physical Properties	Class		
	4A	4B	4C
Hardness, IRHD	55 ± 5	65 ± 5	75 ± 5
Tensile strength, (kg/cm²)	100	120	120
Elongation at break (%), *Max*	450	350	250
Compression set at 70 ± 1°C, (%) *Max*	30	35	35

7.3 *Accelerated Ageing* — The maximum variation of hardness after ageing at 100 ±2°C for 72 hours in accordance with method prescribed under **8.3** shall not be more than ± 15 IRHD. Tensile strength and ultimate elongation shall not vary beyond the value given below.

Tensile strength ± 20 percent, elongation at break $^{+10}_{-25}$ percent from that of unaged sample.

7.4 *Ageing in Oil* — After ageing in applicable oil (*see* Note) at 100 ± 2°C IRHD for 72 hours, the hardness shall not vary by more than ± 8 percent, the tensile strength shall not vary by more than — 35 percent and volume by $^{+20}_{-8}$ percent with respect to actual values recorded before ageing.

Note — Additives used in various oils can affect the performance of rubber and hence while selecting the polymer, compatibility with oil under application needs to be established.

8. Test Methods

8.1 *Hardness* — Hardness of the gaskets shall be tested in accordance with the method prescribed in IS : 3400 (Part 2)-1980 'Methods of test for vulcanized rubbers: Part 2 Hardness (*first revision*)'.

8.2 *Tensile Strength and Ultimate Elongation* — Shall be carried out in accordance with method prescribed in IS : 3400 (Part 1)-1977 'Methods of test for vulcanized rubbers: Part 1 Tensile stress-strain properties (*first revision*)' using type I dumbell test piece.

8.3 *Accelerated Ageing* — The test pieces shall be subjected to this test in accordance with method prescribed in IS : 3400 (Part 4)-1978 'Methods of test for vulcanized rubbers: Part 4 Accelerated ageing (*first revision*)'.

8.4 *Compression Set* — Compression set shall be tested at 70 ± 1°C for 24 hours under 25 percent strain according to the method prescribed in IS : 3400 (Part 10)-1977 'Methods of tests for vulcanized rubbers: Part 10 Compression set at constant strain'. Recovery time of 60 minutes shall be allowed.

8.5 For all types of gaskets, two test slabs, each of the following sizes shall be supplied:

a) 150 × 150 × 2·5 mm, and
b) 150 × 150 × 10 mm.

8.5.1 These slabs shall be compounded identically and cured to the same degree as the gaskets.

8.6 Unless otherwise agreed to between the purchaser and the supplier, all tests shall be carried out within 3 months from the receipt of the material by the purchaser.

9. Sampling — Unless otherwise agreed to between the purchaser and the supplier, the procedure given in IS : 2500 (Parts 1 and 2) 'Sampling inspection tables: Part 1 Inspection by attributes and by count of defects, Part 2 Inspection by variables for percent defectives' shall be followed.

10. Marking — The following details shall be clearly indicated on every gasket for any identification:

a) Manufacturer's name,

b) Type of gasket, and

c) Date of manufacture.

10.1 *ISI Certification Marking* — Details available with the Indian Standards Institution.

11. Storage — Recommendation regarding storage conditions after receipt from the manufacturer are given in Appendix B.

APPENDIX A

(*Clause* 4.4)

WATER ABSORPTION TEST

A-1. Procedure — From the finished gasket, cut a piece of about 3 g and weigh it accurately. Put in 150 ml of distilled water. Boil under reflux with air condenser for 168 hours. Remove the piece and weigh again after surface water layer is dried up with a filter paper.

A-2. Calculation

$$\text{Water absorption, percent by mass} = \frac{W_2 - W_1}{W_1} \times 100$$

where

W_1 = original mass in grams of test piece before immersion in water, and

W_2 = mass in grams of the test piece after immersion in water.

APPENDIX B

(*Clause* 11)

RECOMMENDATIONS REGARDING STORAGE AFTER RECEIPT

B-1. To maintain the gasket in optimum condition they should be stored in cool and dark place. If there is any doubt about the condition of gasket, they should be retested before putting into service.

B-2. Products should be issued in the order of their date of manufacture.

EXPLANATORY NOTE

The vulcanized rubber gaskets covered by this standard are used in water, steam (low pressure), gas installations, diesel engines, etc.

In the preparation of this standard, considerable assistance has been derived from:

IS : 5192-1975 Vulcanized natural rubber based compounds (*first revision*)

IS : 638-1979 Sheet rubber jointing and rubber insertion jointing (*second revision*)

IRSR : 48-1972 Rubber components used in the air brake equipment of the diesel and electric locos; Ministry of Railways, Government of India.

BS 2751 : 1982 Vulcanized butadiene/Acrylonitrile rubber compounds. British Standards Institution (BSI).

BS 2752 : 1982 Chloroprene rubber compounds. British Standards Institution (BSI).

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AMENDMENT NO. 1 SEPTEMBER 1987

TO

IS:11149-1984 SPECIFICATION FOR RUBBER GASKETS

(Page 4, clause 9) - Substitute the following for the existing clause:

"9. Sampling - Unless otherwise agreed to between the purchaser and the supplier, the procedure given in IS:2500(Part 1)-1973 'Sampling inspection tables: Part 1 Inspection by attributes and by count of defects' shall be followed. For this purpose the Inspection Level III and AQL value of 2.5 percent as per IS:2500(Part 1)-1973 shall be taken."

(EDC 58)

Reprography Unit, BIS, New Delhi, India